

Figure S1. Emotion classifier and intensifier facial movements in each culture, Related to Figure 2A and Validating emotion classifier and intensifier facial movements—STAR Methods.

(A) For each culture, color-coded face maps show the classifier (blue) and intensifier (red) facial movements for each emotion. Color saturation indicates the number of receivers showing a statistically significant effect above the population prevalence threshold ($N > 10$; see color bars to right). Color-coded matrices below show per AU results, with the exact number of receivers showing a statistically significant effect shown in each cell.

(B) In each plot, color-coded boxplots and distributions show the posterior probabilities of accurate classification based on the three test sets—i.e., with the full set of AUs (in gray), with classifier AUs removed (in blue), or with intensifier AUs removed (in red; see legend to upper right). Individual points represent individual receivers. Asterisks indicate statistically significant differences between test sets (ANOVA, $p < 0.05$ with Bonferroni corrected over emotions). Results show removing the emotion classifiers (blue) resulted in a significantly decreased posterior probability to accurately classify the six emotions compared to the two other test sets. Similarly, removing the intensifiers (red) resulted in a significantly decreased posterior probability to accurately classify high intensity of each emotion compared to the two other test sets.

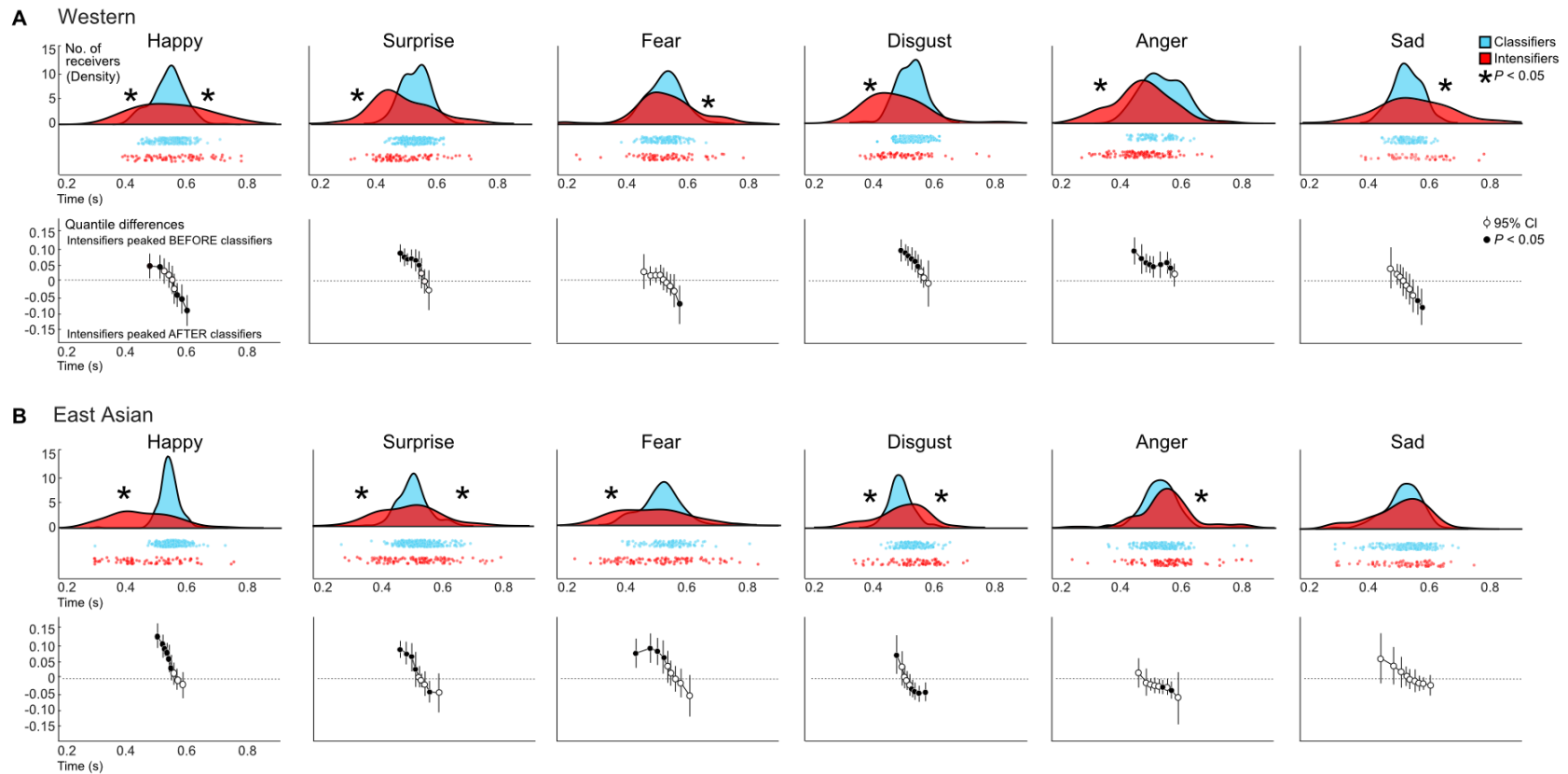


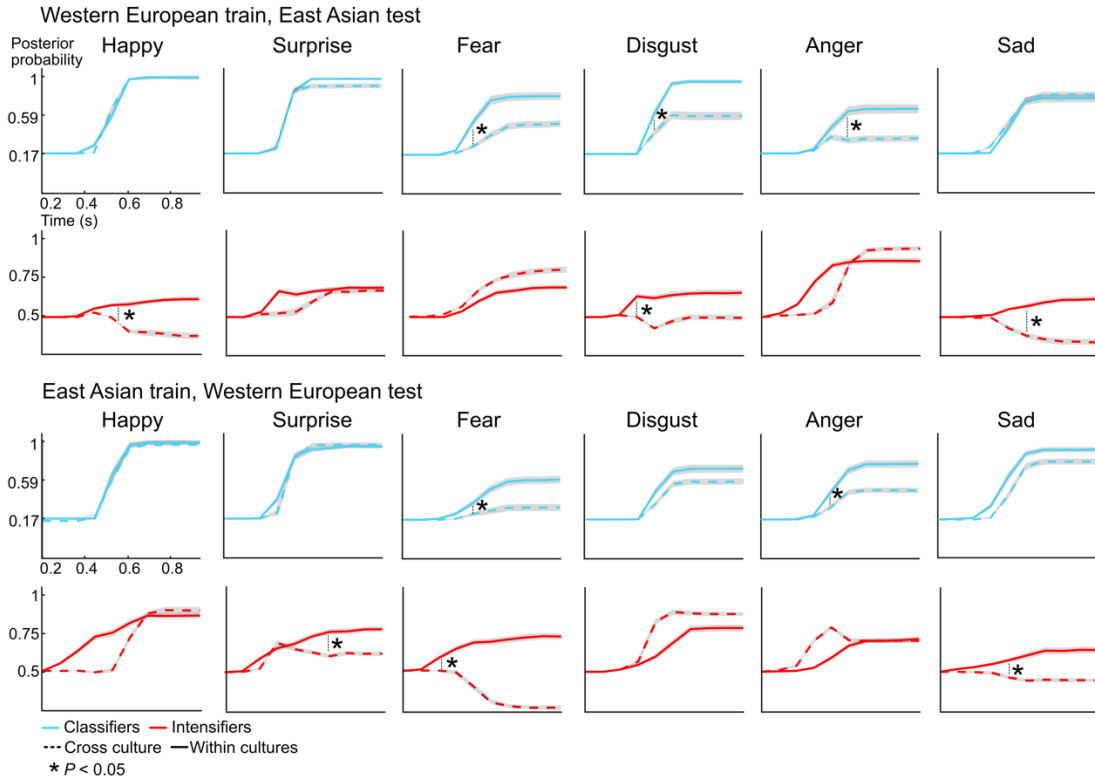
Figure S2. Temporal signatures of emotion classifier and intensifier facial movements in each culture, Related to Figure 2B and Temporal analysis of emotion classifier and intensifier facial movements—STAR Methods

(A) For each emotion, color-coded plots show the distribution of emotion classifier (blue) and intensifier facial movements (red) across time (see legend in upper right). Distribution height represents the kernel density estimation of the number of Western European receivers at each time point. Asterisks denote a statistically significant difference in temporal activation (on left—intensifiers are earlier than classifiers; on right—intensifiers are later than classifiers; see Temporal analysis of emotion classifier and intensifier facial movements—STAR Methods). Below, color-coded circles represent individual receivers and AUs. Line plots show the quantile differences in the peak latencies. For each decile difference, the vertical line indicates its 95% bootstrap confidence interval (CI, see legend to right). Those with solid circles ● in the middle indicate the statistically significant

difference in the peak latencies. CIs above 0 show that the intensifier AUs peaked before the classifiers; CIs below 0 show that the intensifier AUs peaked after the classifiers (see legend).

(B) Color-coded distribution and line plots below show the results for East Asian receivers, using the same lay out as in (A). In both cultures, intensifier facial movements are temporally distinct from emotion classifiers (except sad, East Asian).

A Classification of emotion and intensity



B Cross-cultural confusions

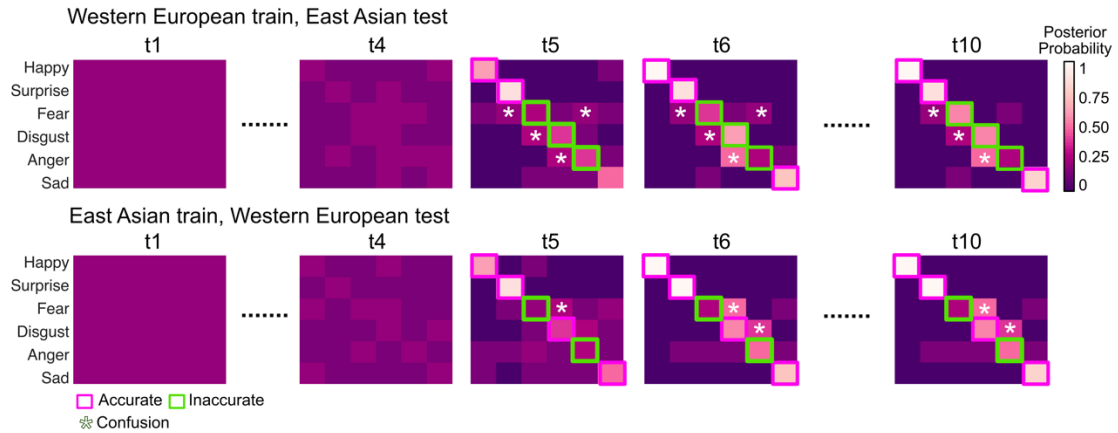


Figure S3. Cross-cultural classification of emotion and intensity, Related to Figure 4 and Cross-cultural classification of emotion and intensity—STAR Methods

(A) Classification of emotion and intensity. For each emotion train-test set (e.g., Western European train, East Asian test), solid color-coded lines show the posterior probability of the Bayesian classifier to accurately classify the emotion (blue) or intensity (red) within each culture. Shaded areas show the standard error of means across test samples. Dashed lines show cross-culture accuracy; asterisks indicate statistically lower cross-culture compared to within-culture accuracy (two-sample t -tests, $p < 0.05$, Bonferroni corrected over emotions). For example, ‘anger’ classifications are statistically significantly lower in accuracy across than within cultures.

(B) Cross-cultural confusions. Next, we examined the cross-cultural misclassifications by analyzing the specific emotion confusions across time. For each train-test set, the color-coded

matrix shows at each time point (i.e., t1-10) the posterior probability to classify each emotion, averaged across the test samples. Brighter colors show higher posterior probability; darker colors show lower posterior probability (see color bar to right). Diagonal squares show the results of cross-culture classification accuracy of each emotion. Pink outlines show which emotions are accurately classified across cultures; green boxes show which emotions are inaccurately classified across cultures. Off-diagonal squares show the cross-cultural misclassifications between emotions. At each time point, we then identified when the cross-cultural misclassifications between emotions is significantly higher than the within-culture misclassifications between emotions and is also higher than the chance level (two-tailed two-sampled t-tests, $p < 0.05$ with Bonferroni correction over emotions). Asterisks indicate statistically significant cross-cultural confusions between emotions—for example, 'disgust' is often misclassified as 'fear' or 'anger' in the cross-cultural classification.

		# of trials	Happy	Surprise	Fear	Disgust	Anger	Sad	Other
Western European	Total	<i>M</i>	356	339	245	452	359	279	371
		(%)	(15%)	(14%)	(10%)	(19%)	(15%)	(12%)	(16%)
		<i>SD</i>	152	113	116	154	159	132	317
	High intensity	(%)	(6%)	(5%)	(5%)	(6%)	(7%)	(6%)	(13%)
		<i>M</i>	172	168	123	223	176	148	N/A
		(%)	(7%)	(7%)	(5%)	(9%)	(8%)	(6%)	N/A
East Asian	Total	<i>SD</i>	76	85	77	87	90	77	N/A
		(%)	(3%)	(4%)	(3%)	(4%)	(4%)	(3%)	
		<i>M</i>	452	408	203	417	396	331	193
	High intensity	(%)	(19%)	(17%)	(9%)	(17%)	(16%)	(13%)	(8%)
		<i>SD</i>	194	159	90	131	189	133	170
		(%)	(8%)	(7%)	(4%)	(5%)	(8%)	(6%)	(7%)
High intensity	<i>M</i>	233	196	99	200	188	164	N/A	
	(%)	(10%)	(8%)	(4%)	(8%)	(8%)	(7%)	N/A	
	<i>SD</i>	134	100	57	91	80	90	N/A	
		(%)	(6%)	(4%)	(2%)	(4%)	(3%)	(4%)	N/A

Table S1. Distribution of receivers' emotion category and intensity responses plus 'other', Related to Modelling emotion classifier and intensifier facial movements—STAR Methods

For each culture, the first row ('Total') shows the average (mean) number and proportion (%) of trials where the receivers selected each emotion category or 'other', with standard deviation (SD) shows the variance across receivers. The second row ('High intensity') shows the average number and proportion of trials where the receivers selected the emotion and rated it as high intensity.

		Mutual Information	Happy	Surprise	Fear	Disgust	Anger	Sad
Western European	Classifier AUs	<i>M (SD)</i>	0.08 (0.04)	0.08 (0.03)	0.09 (0.07)	0.07 (0.03)	0.08 (0.04)	0.09 (0.05)
	Intensifier AUs	<i>M (SD)</i>	0.16 (0.11)*	0.16 (0.11)*	0.20 (0.13)*	0.13 (0.08)*	0.14 (0.07)*	0.14 (0.11)
East Asian	Classifier AUs	<i>M (SD)</i>	0.09 (0.04)	0.10 (0.04)	0.13 (0.06)	0.07 (0.03)	0.09 (0.06)	0.09 (0.04)
	Intensifier AUs	<i>M (SD)</i>	0.17 (0.11)*	0.19 (0.11)*	0.29 (0.16)*	0.16 (0.10)*	0.17 (0.09)*	0.20 (0.14)*

Table S2. Relationship between facial movement amplitude and emotional intensity judgments, Related to Figure 2B

In each emotion and each culture, we estimated the strength of relationship between the amplitude of facial movements (i.e., emotion classifier AUs or intensifier AUs) and emotion intensity judgement using Mutual Information. High Mutual Information values indicate a strong relationship between the amplitude of facial movements and emotion intensity judgement. We did this for each receiver separately (see per receiver results in Additional Information available on the Open Science Frame repository, <https://osf.io/3m95w/>). This table shows the average (mean) Mutual Information values across the receivers, for classifier AUs and Intensifier AUs respectively. We identified the statistically significant differences in the Mutual Information values between classifier AUs and Intensifier AUs using a paired-sample *t*-test ($p < 0.05$, two-tailed, Bonferroni corrected over emotions; see asterisks in the table).

		Happy	Surprise	Fear	Disgust	Anger	Sad	
Classifier AUs	Cross-cultural	Lip Corner Puller (AU12) Dimpler (AU14) Sharp Lip Puller (AU13) Lips Part-Lip Corner Puller (AU25-12)	Inner-Outer Brow Raiser (AU1-2) Jaw Drop (AU26) Mouth Stretch (AU27)	N/A	N/A	N/A	Brow Lowerer (AU4) Chin Raiser (AU17) Lip Pressor (AU24) Eyes Closed (AU43)	
	Culture-specific	Western European	N/A	N/A	Brow Lowerer (AU4) Lip Stretcher Left/Right (AU20L/R)	Nose Wrinkler (AU9)	Lower Lip Depressor (AU16)	
		East Asian			Lower Lip Depressor (AU16) Mouth Stretch (AU27)	Lip Stretcher Left/Right (AU20L/R)	Nose Wrinkler (AU9) Upper Lip Raiser Left/Right (AU10L/R) Lip Tightener (AU23)	
Intensifier AUs	Cross-cultural	N/A	N/A	N/A	N/A	Upper Lid Raiser (AU5) Nose Wrinkler (AU9) Mouth Stretch (AU27) Lips Part-Lip Corner Puller (AU25-12)	N/A	
	Culture-specific	Western European	Upper Lid Raiser (AU5) Lips Part (AU25)	N/A	Brow Lowerer (AU4) Lip Stretcher (AU20)	Lip Stretcher (AU20) Mouth Stretch (AU27) Eyes Closed (AU43)	N/A	Jaw Drop (AU26) Eyes Closed (AU43)
		East Asian	Upper Lip Raiser (AU10) Lip Corner Puller-Cheek Raiser (AU12-6)	Lip Corner Puller-Cheek Raiser (AU12-6) Lip Corner Puller (AU12) Lips Part-Lip Corner Puller (AU25-12)	Nose Wrinkler (AU9) Upper Lip Raiser (AU10) Lip Corner Puller-Cheek Raiser (AU12-6) Lip Funneler (AU22)	Lip Corner Puller-Cheek Raiser (AU12-6) Lips Part-Lip Corner Puller (AU25-12)	N/A	Cheek Raiser (AU6) Nose Wrinkler (AU9) Lip Corner Puller-Cheek Raiser (AU12-6) Chin raiser (AU17)

Table S3. Facial movements driving cross-cultural classification, Related to Figure 4

For classifier and intensifier AUs, we identified the AUs that drive statistically significantly lower vs. accurate cross-cultural classification of facial expressions using a leave-one-out approach. This table shows the list of AUs that are shared in the two cultures ('Cross-cultural') and those are different in the two cultures ('Culture-specific'). See more details of per AU results in Additional Information available on the Open Science Frame repository, <https://osf.io/3m95w/>.